WHITE PAPER
ON
DEPLOYABLE DECISION SUPPORT TECHNOLOGY

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a division of NCR

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Use of Decision Support Technology
In
Forward Areas of Responsibility

INTRODUCTION

The intelligent and timely application of information in combat is becoming as potent a weapon on 21st Century battlefields as any munition, plane, soldier or ship. The keys to successfully exploiting data and turning it into actionable information are several:

- Ensuring that information is consistent and readily available at all levels of command
- Ensuring that the capability to exploit this data reflects a minimal, deployable footprint
- Differentiating between static, fluid and immediate data, and managing these three types of data accordingly
- Minimizing the flow of all but the most time-sensitive data through the transmission media available to decision makers in a wartime environment.

Technology exists today which can help ensure that these four keys are met in deployed decision support scenarios. The purpose of this paper is to provide a high level overview of how decision support solutions could be exploited by the Air Force to support deployed units. Such usage would further leverage for the Air Force's growing investment in decision support technology, as exemplified in its existing Knowledge System, AF FIRST and CRIS decision support technologies.

BACKGROUND

In the commercial world today, data warehousing, also known as decision support solutions, is the market-leading technology of choice. Industry leaders such as Wal*Mart, FedEx, 3M, and Bank of America need a single view of their business, reflected in an ability to source data from the widest possible variety of sources. This capability ensures they can clearly see across their "battlefields" and respond to the challenges, opportunities and threats armed with the broadest possible perspective of the environment in which they are operating. To achieve this capability, many industry leaders, including those listed above use decision support technology.

In a similar manner, military decision makers must be able to "see" as much of the battlesphere as possible and be able to do so from a minimum number of source systems. As the Air Force Chief Information Officer, Mr. John Gilligan, remarked at a recent "E-Gov" conference: "…all too frequently, what we have are multiple formats, we have redundant information, we have many official sources."

Multiple data sources inherently contribute to the "fog of war". This can lead to a less than clear perspective of critical issues, such as the nature and disposition of both friendly and opposing forces, as well as the threat, immediacy and lethality of time-sensitive targets.

As with their commercial counterparts, military decision makers must also contend with what can be referred to as three different time-dimensions of data:

- static,
- fluid, and
- immediate data.

However, for a military decision maker the ability to act on these data can literally mean the difference between life and death.

Military planners must also contend with ensuring that combat support capability being deployed represents the minimal footprint possible. This is to minimize targets of opportunity for opposing forces and/or terrorists, as well as helping alleviate air and/or sealift constraints. In the case of decision support technology, planners need to see if there is a way to deploy only that capability needed to support a particular area of responsibility, versus trying to deploy an entire decision support infrastructure. The approach outlined in this paper can provide such a capability, particularly in the context of the three time dimensions of data, as defined below.

THE TIME DIMENSIONS OF DATA

For the purpose of this paper, data has been grouped into three distinct time dimensions:

- **Static Data:** this is information that is important to combat planning and execution, but is basically static or unchanging in nature. Static data would include topographical information; historical weapon systems maintenance and utilization data; as well as data relating to fixed, man-made structures such as airfields, roads, dams, etc. While ancillary data related to each of these might change in the course of a conflict, for example a road or building might be destroyed in the conflict, the basic information inherent in this data does not change over time.

- **Fluid Data:** this is data which changes over relatively short periods of time -- hours or days -- but not necessarily in a time sensitive (i.e., immediate) manner. Examples of fluid data would be the US Air Force air order of battle; the opposing forces air order of battle; stores and locations of munitions; and repositioning of *major* enemy and coalition forces.

- **Immediate Data:** this is data which is time sensitive; changes in immediate data require instantaneous, or near-instantaneous (i.e., less than five minute elapsed time) responses. Examples of immediate data include movement of mobile missile launchers; loss of a friendly aircraft; overwhelming and/or surprise enemy/terrorist threat to coalition forces/infrastructure.

While Immediate Data often (and deservedly) gets significant amounts of attention, Static and Fluid Data are of immense importance to decision makers at all levels of command. The key is to provide access to Static and Fluid Data in such a way that Immediate Data is not “lost” in the data flow, and can be given the timely attention it needs.

DECISION SUPPORT SOLUTION OVERVIEW

One way to accomplish this is the use of decision support technology. Based on a centralized architecture, user are provided a single view of their business by combining data from any number of disparate data sources into single, linearly scalable database. It is fully web-enabled as well as being capable of being continuously refreshed/updated "on the fly." Through the application of massively parallel processing technology, this solution can provide rapid and reliable access to information by any number of users asking any number of concurrent complex queries.

DEPLOYABLE DECISION SUPPORT TECHNOLOGY

Taking into consideration the four keys to success mentioned in the Introduction, a deployable decision support solution (DSS) can be based on a minimally sized DSS infrastructure. The principal focus of this decision support system would be access to Static and Fluid Data. Immediate Data requiring some level of time-sensitive analysis might also be supported on a case-by-case basis, the main constraint being the ability to instantly refresh/update the deployable DSS component due to potential bandwidth constraints.

The concept of operations for such a deployable DSS is as follows. Data sourcing of the deployable DSS would be from an enterprise data warehouse, for example, the AF Knowledge System (AFKS). However, the deployable DSS's logical and physical data models, that is the relational data base structure within the deployed system would restrict data loading to that data relevant to a selected forward deployed area/AOR. The deployable DSS could be housed in a standard sized mini-tower computer, similar to what can be found in most Air Staff action officer's cubicles today. Minimal hardware requirements for the deployed DSS hardware would be as follows:

Windows 2000 OS
80 - 100GB Disk Storage
1GB of RAM
2.0GHz processors

When a deployment was imminent, the deployable DSS would be refreshed and shipped with the appropriate user element. Selection of what data to load would be critical. Initially, thought should be given to loading only that data which would fall principally into the Fluid Data category. For example, only six months of the deploying units aircraft histories would be loaded. The remaining data – the AFKS holds up to 10 years worth of data on some aircraft types – could be remotely queried from the CONUS-based AFKS as described below. Some amount of selected Static Data, such as historical weather data, could also be loaded.

Once in theater, the deployable DSS would be linked via the Web to the AFKS for an initial deployed data refresh. Then the system could be "burst refreshed" on a periodic, user-defined basis. Appropriate data from the AFKS would be trickle fed to a staging server; this data could then be quickly pulled by the deployable DSS whenever the

users decided that they needed to update their data, and/or had the query “downtime” to accomplish this update. Figure 2 depicts a notional representation of the architecture.

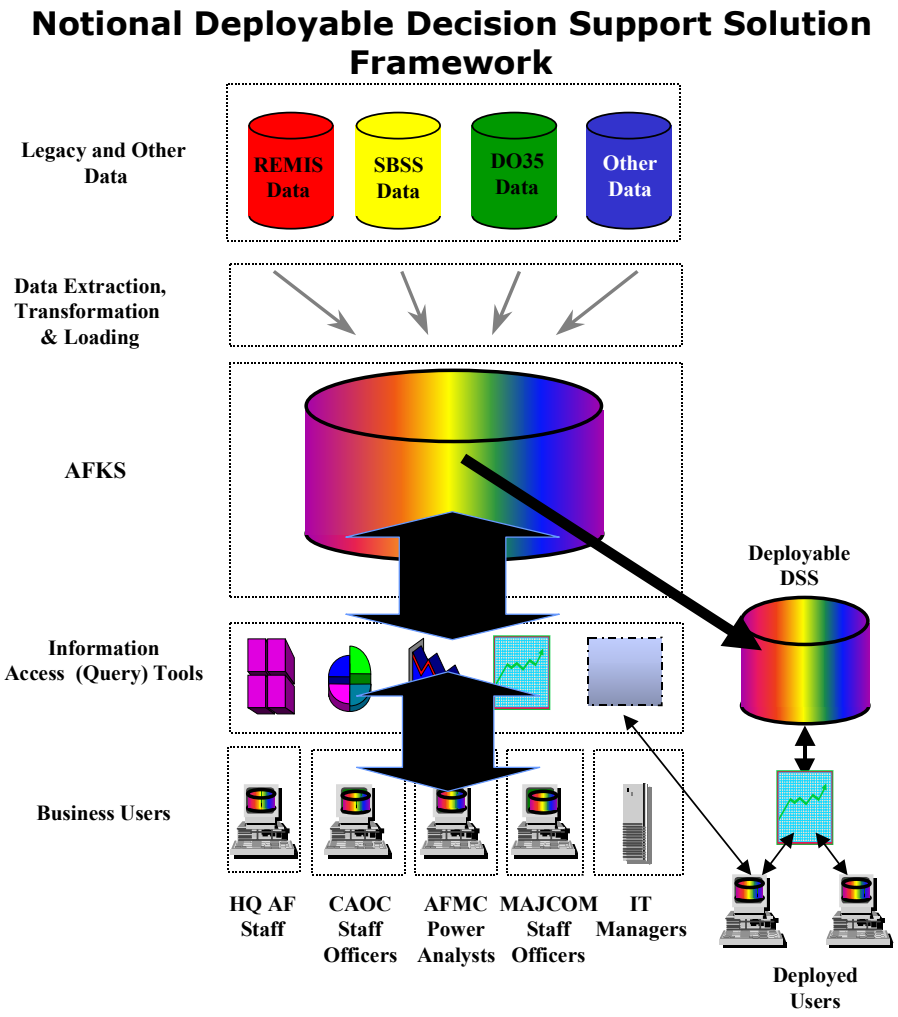

Figure 1

Because the deployable DSS is sourced from the AFKS, decision makers at all levels and locations are literally seeing the same information because they are all querying against a single data source: the AFKS. This satisfies the requirements of the first two keys in the Introduction: consistent and readily available data, provided in a deployable, minimally sized package.

Differentiation and prioritization of the three data categories are also supported, as the deployed decision makers have ready access to Fluid Data, which can be used to support Immediate Data requirements. Additionally, based on bandwidth availability, deployed users in need of either other Static or more in-depth Fluid Data could query against the CONUS-based AFKS via the web. Because all the "heavy lifting" processing of queries is done in the AFKS' relational database management system, the only data that would be sent and received at a deployed location would be an SQL query stream and reply. Thus, bandwidth is still available primarily to support other data transportation requirements.

SUMMARY

Teradata believes that enhanced combat support to AF warfighters can be achieved through the application of deployed decision support technology. Such an approach would leverage existing Air Force investments in decision support technology, as well as supporting DoD and AF goals of maximizing network-centric support to warriors.

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